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Removal of diazinon and 2,4-dichlorophenoxy-acetic acid (2,4-D) from aqueous solutions by granular-activated carbon

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ABSTRACT

In this paper, batch removal of diazinon and 2,4-dichlorophenoxyacetic acid (2,4-D) from aqueous solution by granular-activated carbon was investigated. The required concentrations of toxins were prepared by appropriate dilution of the stock standard solution. There was a significant relationship between chemical oxygen demand (COD) and toxins concentration and that COD was measured instead of direct analysis of toxins. For all the concentrations tested, removal efficiency increased by increasing contact time for both toxins. The highest removal efficiency of 90% for 2,4-D and 88% for diazinon obtained in 50-min contact time. The highest value of toxin removal for both toxins occurred at pH=6. Based on the results obtained, one can conclude that granular-activated carbon has high efficiency in 2,4-D and diazinon removal from aqueous solution.

Keywords: Granular-activated carbon; Diazinon; 2,4-Dichlorophenoxyacetic acid; Adsorption; Aqueous solutions

1. Introduction

Increasing use of pesticides and improper sewage disposal may cause water resources pollution and extremely damaging effects on the environment [1,2]. The pesticides considered as persistent organic pollutants (POPs) are found in effluent of pesticide-producing industries and drainage of agricultural activities [3]. Used pesticides may percolate into water sources as a result of direct washing and irrigation [4,5]. 2,4-Dichloro phenoxyacetic acid (2,4-D) is a commonly used herbicide from phenoxyacetic acid category with weak aromatic characteristics. Its soluble derivatives have been extensively applied to eliminate broadleaf weeds in agriculture, parks, and pastures worldwide. 2,4-D toxin may endanger human and animal health through exposure to polluted air, earth, food, and water [6,7]. Diazinon is a type of organophosphate pesticides and volatile insecticide greatly applied to eliminate flies and ticks, especially O. tholozani tick. This toxin is widely used in farms and its residue could be found in underground waters and rivers [8–12]. Entering these pollutants into drinking water supply sources may cause human health and environment concerns. The incidence of their harmful

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